MAINTENANCE DREDGING

PORTLAND HARBOR

PORTLAND, MAINE

DRAFT SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

MARCH 1979

SUMMARY SHEET

Portland Harbor Maintenance Dredging

(X) Supplement to the Draft Environmental Statement ( ) Final Environmental Statement

Responsible Office: U.S. Army Corps of Engineers, New England Division, Waltham, MA

1. Name of Action: (X) Administrative ( ) Legislative

2. Description of Action: The Corps of Engineers plans to maintenance dredge the Federal navigation channel in Portland Harbor, Maine. The channel is authorized to be maintained at a depth of 35-feet and at widths varying from 1,400-feet to 300-feet. To re-establish these dimensions, approximately 850,000 cubic yards of sediments must be removed from the channel and disposed of. This supplement is primarily concerned with the disposal operations.

3. Environmental Impacts: Several minor impacts would occur from this operation; these include (1) the loss of organisms at disposal site, and (2) the loss of some economical species at the site. However, the impacts to the ecosystem should be acceptable.

4. Comments Requested

a. Federal

U.S. Department of Housing and Urban Development
Environmental Protection Agency
U.S. Department of Commerce
U.S. Department of Health, Education and Welfare
U.S. Department of the Interior

b. State

Maine Historic Preservation Commission
Office of Planning and Programming Coordination
Department of Natural Resources
Executive Office of Environmental Affairs
State Planning Office
Environmental Improvement Commission

c. Local

Cities of Portland and South Portland, Maine
Sierra Club
Maine Resources Commission
Maine Audubon Society
The Maine Association of Conservation Commissions

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PURPOSE OF THE SUPPLEMENT

This is a Supplement to the Draft Environmental Impact Statement (EIS) for the Maintenance Dredging of Portland Harbor in Portland, Maine, filed with CEQ on 11 February 1977. This supplement has been prepared to discuss the effects of disposal at a new open water site which has been suggested and studied since the Draft EIS was issued.

When the Draft EIS for Portland Harbor project was issued, the Corps expected to use a disposal site located at 43° 31′ 40"N and 70° 06′ 06"W; this site had been designated by EPA as an interim site and it had been studied by Normandeau Associates, Inc., for the New England Energy Company's EIS. Further studies were conducted for the Corps to confirm that the conditions at the site were as stated and to gather additional information. From these studies the Corps' contractor suggested that the disposal site be moved about 1/2 mile southeast of the previous site. Coordination with the concerned Federal and State Agencies was initiated to determine if the site was acceptable to these agencies. It was.

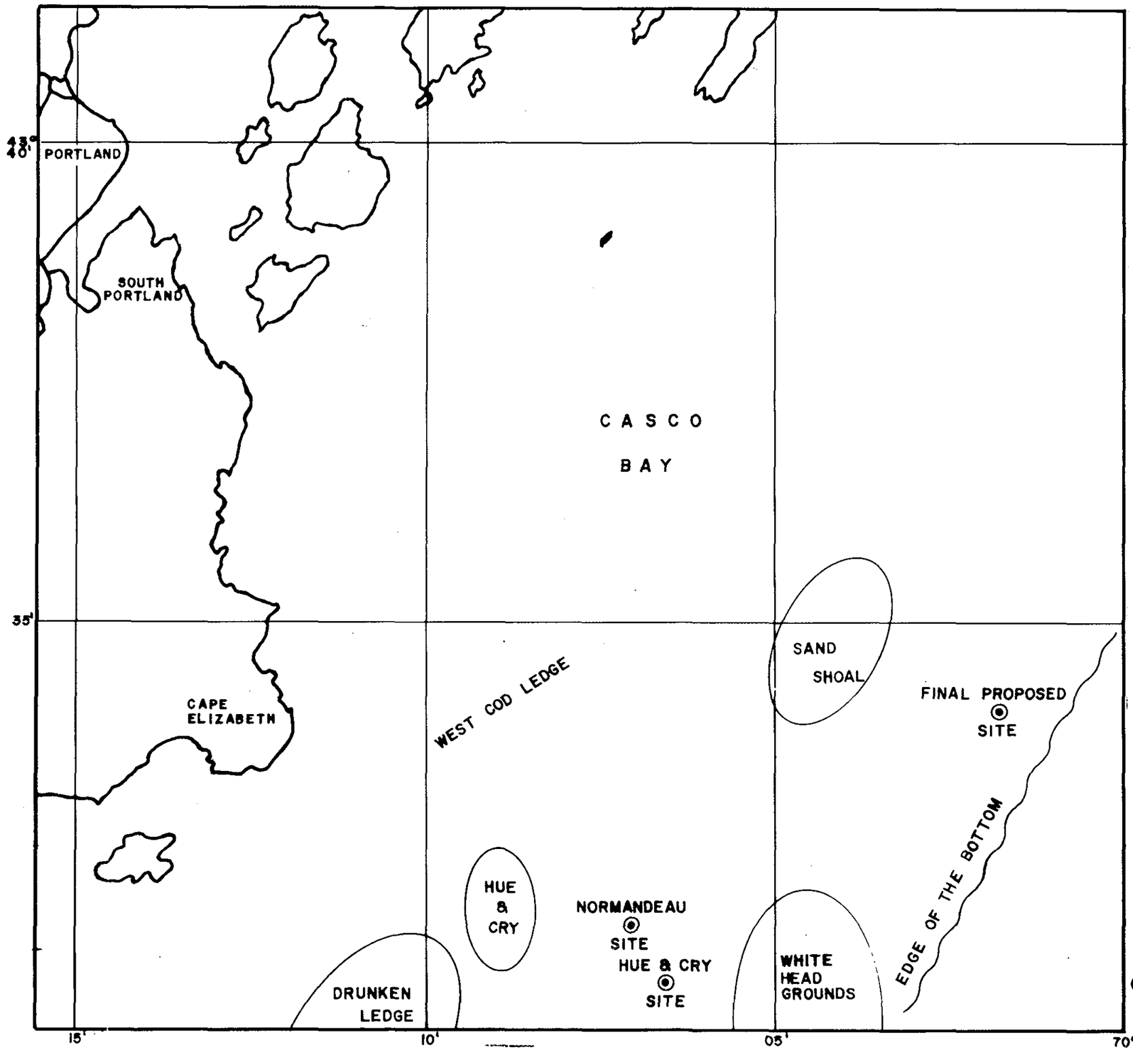
However, when the Corps notified the public in April 1977 about the new disposal site, the local fishing community raised objections. The new location was in one of their fishing grounds. The fishermen were also opposed to returning to the old site and they suggested a different area located at 43° 34′06"N, 70° 02′00W (See Figure 1 which shows the locations of all three sites). The latter site is located just beyond the 3 mile limit of the territorial sea.

Thereafter the Corps initiated studies to determine the new area's suitability. This Supplement will present the information developed in these studies and will discuss the expected impacts from the disposal operations. The Draft EIS presented the other impacts associated with dredging in a generic manner; consequently these impacts would still be applicable and will not be discussed in this Supplement.

After this Supplement has been reviewed by concerned organizations and individuals, the comments and the supplemental materials will be incorporated into a Final EIS.

INTRODUCTION

Preliminary estimates indicate the need to remove approximately 850,000 cubic yards of sediment; the yardages may increase if a Spring 1979 survey shows additional shoaling. Some private dredging may also take place, but no estimate of the amount is now available. The areas to be dredged are shown crossed hatched on Figure 2. The sediments will be excavated by a clamshell dredge and deposited in bottom dumping scows. The scows will then be towed about 12 nautical miles to the dump site and dumped at a buoy to be placed by the Government. It is estimated by the Corps that the entire operation may take as long as a year.



CASCO BAY

AND

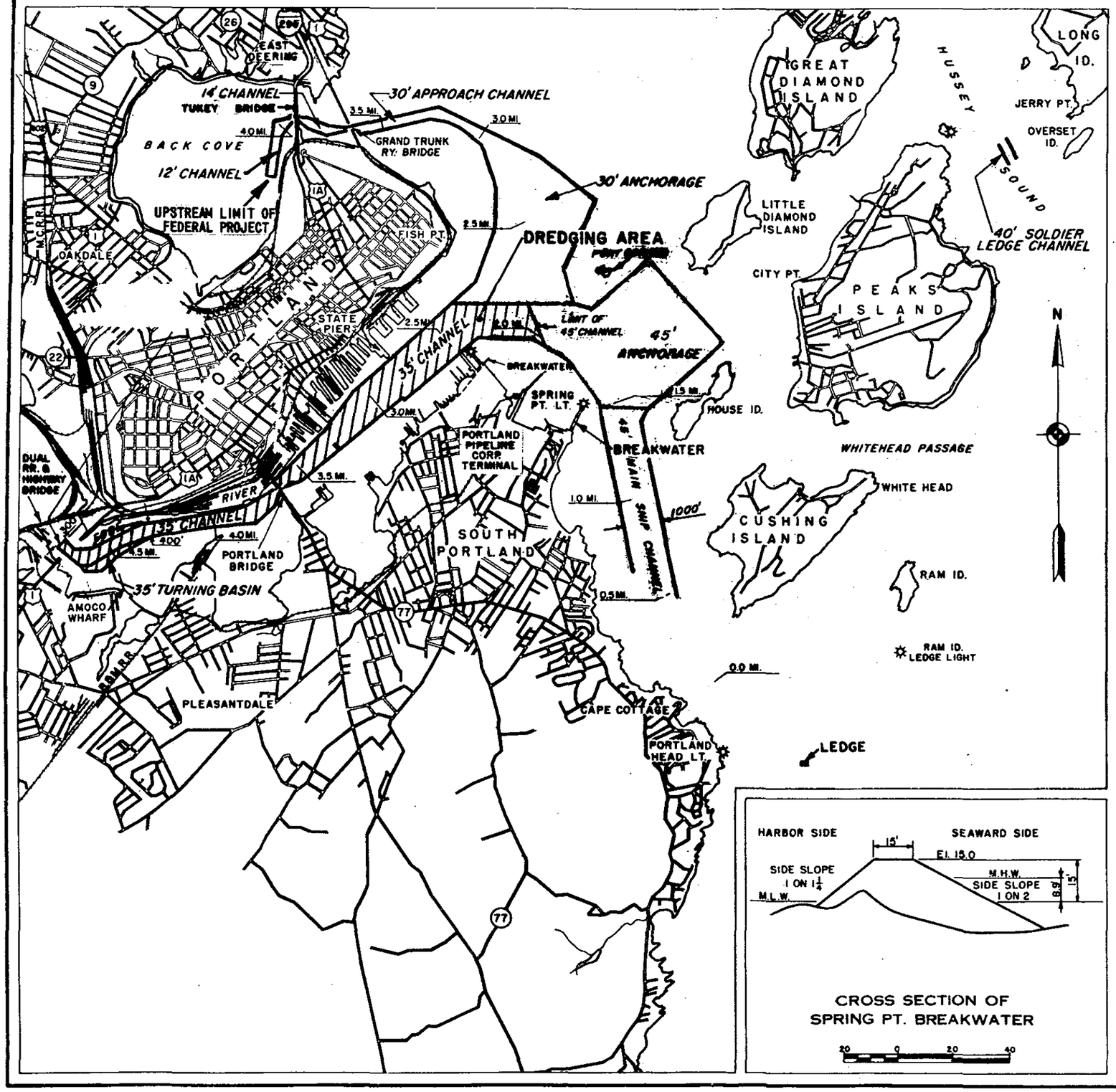
VICINITY

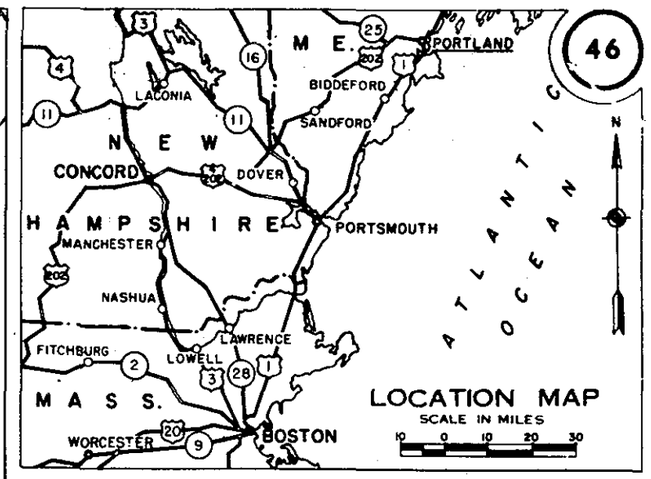
NOT TO SCALE

FIGURE 1

CORPS OF ENGINEERS

U. S. ARMY





BRIDGE CLEARANCES

PORTLAND HARBOR (BASCULE)
Hor. 100 ft.
Vert. 31 ft. M.H.W.

TUKEY BRIDGE
HOR. 100 FT.
VERT. 30 FT. M.H.W.

DUAL R.R. & HY. FIXED BRIDGE
HOR. 99 FT.
VERT. 10 FT. M.H.W.

CROSS SECTION OF SPRING PT. BREAKWATER

PORTLAND HARBOR, MAINE

30 SEPTEMBER 1976

IN 1 SHEET

SCALE IN FEET

1000 0 1000 2000 3000 4000

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

FIGURE 2

ENVIRONMENTAL SETTING

TOPOGRAPHY

The general topography of the region south of Portland in Casco Bay consists of a series of ridges and valleys running perpendicular to the coast. The valleys have varying amounts of sand, gravel, and fine silt.

The mile square area of the proposed dump site is extremely rough due to a series of rock outcroppings. Nowhere in the region is there a smooth bottom, which is characteristic of areas receiving large amounts of sediment; however, there are pockets where fine grained sand exists. This was borne out by dredge samples taken in the specific basin to be used for disposal.

Profiles across the site and side scan data indicate a basin approximately 600 meters on a side with a depth greater than 60 meters (197 feet) at the center of this depression. A rough estimate of the capacity of the site is 6-9 million cubic yards, assuming a minimum of 50 meters of water over the sediment pile.

CURRENTS

From 18 May to 10 July 1978, a current meter recorded the velocity and direction of the water at the center of the disposal site. The instrument was situated 1.5 meters off the bottom in 60 meters of water. During the first week of use, the instrument did not record the direction of the currents properly. (It is believed that the tether of the current meter was tangled with the mooring wire.) After that, the recorder did function properly, and the following information was taken from these readings.

Most of the peak velocities ranged between 15 and 20 cm/sec; however, there were speeds as high as 28 cm/sec. The primary currents seem to be derived from the tides since direction of the currents are from the south and north quarter (see data after coordination section).

The low value obtained for kinetic energy, the lack of significant tidal flow, and the relatively deep location of the site all indicate that containment of the sediments would be feasible in this area. The 10 percent highest velocity measured during sampling was 13.6 cm/sec., well below the threshold for moving even the finest sediments.

BENTHIC COMMUNITY

In December 1977 three anchor dredge samples were taken at the proposed disposal site. The major constituents of the three samples were marine worms and shellfish. A total of 291 worms, belonging to 35 species and accounting for 42 percent of all individuals, was collected. Shellfish accounted for exactly the same number of individuals and percentage; however, only 14 species were present. These two groups accounted for 84 percent of the total number of individuals sampled.

Five species of marine worms constituted nearly 50 percent of the total number of individuals. In decreasing order of abundance these were: Lumbrineris fragilis (39), Nimoe nigrippes (35), Ampharete acutiferons (28), Goniada maculata (21), and Nephthys incisa (18).

The shellfish sampled were dominated by four species: Astarte undata (127), Cyclocardia borealis (55), Astarte subaequilstera (51), and Arctica islandica (38). Arctica islandica, the mahogany clam, is the only one with a potential for commercial importance.

Table I reveals that the number of species and individuals from samples 1 and 3 were similar, and substantially higher than number 2. The reason for this difference was because the sampler was not completely filled and also rocks were present--indicating a rougher substrate.

One of the drawbacks of a dredge sampler is that it gives a poor indication of the quantity of organisms for a given area, but it does furnish information on the relative abundance and species composition. The following inferences may be drawn from the data:

> The large number of species and reasonably abundant number of individuals found in the samples would suggest that the area is probably quite productive and that the population is probably quite stable. The presence of a relatively diverse and reasonably abundant population of amphipods (a group usually considered sensitive to pollution) indicates a nonpolluted area. Some of the organisms found in relative abundance (e.g., the amphipod Unciola irrorata and various polychaetes) at this location are known to be preyed upon by various finfish.

TABLE 3.

A data summary of biological samples collected from the Portland, Maine dumpsite on 15 December 1977.

	No. of species	No. of individuals
Dredge #1	54	300
Dredge #2	18	26
Dredge #3	50	362

Total number of Phyla - all three dredges - 10

Total number of species - all three dredges - 71

Total number of individuals - all three dredges - 688

Predominant Groups

Annelida	No. of species	No. of individuals
Dredge #1	29	104
Dredge #2	8	9
Dredge #3	26	178

Total number of Annelida species - 35

Total number of Annelida individuals - 291

Mollusca	No. of species	No. of individuals
Dredge #1	7	144
Dredge #2	7	13
Dredge #3	11	134

Total number of Mollusca species - 14

Total number of Mollusca individuals - 291

Because of the similarity in samples from the Normandeau site, the Hue and Cry site, and the final disposal site, it appears that the fauna in the entire area is stable--over the region and seasons.[1]

FISHERIES

A study of the types and patterns of fishing was conducted for the Portland area. Most of the information collected came from interviews with 10 fishermen, the Marine Department of Marine Resources, and the National Marine Fisheries Service's Port Agent.

Otter trawling, or dragging as it is more often called, is restricted to stretches of relatively smooth bottom. In choosing a possible disposal site, it is desirable to avoid dragging areas and those areas where the disposed materials might be moved by currents into dragging grounds.

The "edge of the bottom" is the primary dragging ground near the disposal area (See Figure 1). During the summer, about 10 vessels fish for flounder such as dab, gray sole, and winter flounder. In the winter and early spring, larger offshore vessels will also fish the area with as many as 25 vessels. The catch is mainly cod, haddock, and other similar groundfish. The vessels are based primarily at Portland and Cundys Harbor, but a few are from Biddeford.

"Hue and Cry Gully" is a less important fishing area, but of considerable importance to individual Portland based inshore vessels. The gully is the location of an earlier proposed disposal site; however, the restricted area available for dragging and possible transport of spoil made it a poor choice as far as fisheries were concerned.

Historically, tub trawling (fishing with long baited lines) has been carried out on rough bottoms where an abundance of invertebrates draw fish to feed. Little tub trawling is now carried out in this area. Gill netting has taken its place to some extent and in late winter and early spring some gill netting is done inshore of the "edge of the bottom" and on the "White Horse Grounds." Most gill netting is done further offshore.

Most of the important fish in this area have buoyant eggs or spawn in estuaries (winter flounder). An exception to this is herring (Clupea harengus) which spawn on gravel and, therefore, would probably not utilize the deep bottom at the proposed site.

Lobsters. The suggested disposal site is offshore of most of the Casco Bay lobstering activity. Lobstering is heaviest in shallow water around the Cod Ledges and shoreward during the summer. At the disposal site, lobstering is carried out from November through April. At this time, lobsters are not active in cold shallow waters and the deeper water gives gear protection from storms. A lobsterman, who had to leave his gear in the deeper water over the summer of 1977, found that some lobsters remained there throughout the summer.

In 1977 there were three lobstermen making use of the proposed site (from Portland, South Harpswell, and Bailey Island) but at least three more have fished this area in previous years. All the lobstermen may run as many as 3,000 pots, but one man has the majority of pots. Typical pot spacings are 10 pot strings set in lines of 100-110 pots per mile running NE-SW. Thus it is possible that several hundred pots could be placed in the proposed disposal site.

Lobstermen thought that they could work around the spoil disposal area, but were concerned that tow boats and scows would foul their gear. The Corps will require all tow boats to follow a specified path; this should eliminate the problem.

ENVIRONMENTAL IMPACTS

BIOASSAY

Bioassay tests were conducted on the Portland Harbor sediments. The bioassay test consisted of three phases--liquid, suspended, and solid. These phases would impact the environment when sediments are released in ocean waters. Sensitive organisms are placed in tanks containing the different phases and the lethal impact to the organisms is determined.

A statistical analysis of the results showed no significant mortalities in the liquid phase. In the suspended phase, one species of zooplankton--Acartia tonsa--did have significant mortalities; all other organisms in this test showed no major difference between the control and test organisms. In the solid phase, the mortalities between the control and test organisms were 10 percent or less which is an acceptable level for the solid phase test.

The mixing of water masses at the proposed disposal site would more than adequately dilute any toxic substances found in the Portland Harbor sediments. Consequently, even though there were statistically significant mortalities for one organism in the bioassay test, mixing would reduce toxic substances to acceptable levels, and any adverse impacts from ocean disposal should be minimal. (A complete set of results will be supplied upon request.)

IMPACT TO FISHERIES

It is likely that one or more species spawn at the proposed disposal site, for it would be difficult not to find an area on the continental shelf where some spawning did not occur. But the main concern should be whether or not the disposal operations would have significant impact on any major commercial or ecological species.

Table 2 was developed to show the spawning requirements for commercial fish within the Gulf of Maine.[2] As the table shows, most commercial species produce buoyant eggs; the exception to this are herring and winter flounder. Therefore the impacts to most fish should be slight since any discharged sediments would not cover large clusters of eggs. However, dumping could cause a physical or chemical impact to buoyant eggs.

The extent of this impact can best be appreciated by showing

a hypothetical impact to one particular species. For example, it has been estimated---"that in the first few months of a cod's life, mortality must be as high as 99.9999%."[3] Consequently, even if the disposal operations adversely impacted 100 million cod eggs or larvae, the potential loss to fishery and breeding stock would be only 100 individuals. This would be an insignificant number when compared to a total population or even a local population. A similar analogy could be made for most other species.

For those species where the eggs remain on the bottom, herring is the only one with potential for an impact--winter flounders spawn in estuaries. The Booth Bay Laboratory in Booth Bay, Maine, was contacted concerning this matter;[4] the Corps was informed that the proposed site is the best choice in the immediate area, since both further up and down the coast are known herring spawning grounds. Therefore it is not likely that this species would be severely impacted by any disposal operations.

IMPACT TO SHELLFISHERY

Ocean quahog is a shellfish found at the disposal site, and there has been some interest lately in developing an ocean quahog fishery. The Maine Department of Marine Resources has found that the best yields of quahogs were taken at depths between 40-60 feet.[5] The National Marine Fisheries Service surveys show that around New England quahogs are usually found at depths of 60-90 feet.[6] Since the disposal site is in nearly 200 feet of water, it is likely that only a limited number of quahogs are present at the disposal site; therefore no major impact should occur to any commercial fishery for this organism.

IMPACTS TO BENTHIC COMMUNITY

When sediments are dumped in ocean waters, many of the benthic organisms present at the site are killed. If just the total number or quantity of organisms are looked at, it may appear that a substantial impact would result. But if the loss is analyzed as to its impact on other organisms feeding in the area, the impact may not be as alarming. The following theoretical analysis may help to bring this point out.

A productive benthic community might contain 20g of organisms per square meter (dry weight)[7]. Assuming that disposal of dredged material covered 10,000 m^2, then the total weight of organisms lost would be 200,000 grams. In addition, it has been found that a benthic community can produce 2.44 times its standing crop[8]. Thus the total loss of weight per year would be 488,000 grams. A number of people have studied the amount of energy

Table 2

SPAWNING CHARACTERISTICS
OF
COMMERCIAL SPECIES

Species	Time of Year	Depth of Water	Type of Bottom	Eggs	Region
COD	Late February thru May	300 feet	Off the bottom	Buoy	Cape Elizabeth Minor
HADDOCK	Late February until May	60 to 390 feet	Sand, gravel, mud & rocks alternate	Buoy	E. Cape Elizabeth Can be plentiful
POLLACK	Late autumn & early winter	360 feet	Broken	Buoy	No major production East of Cape Elizabeth
WHITE HAKE	Late winter to late summer	Shoal waters	--	Buoy	--
HERRING	September & October	Shoal areas & ledges	Shoal areas & ledges	Attached	Casco Bay Cape Elizabeth
WINTER FLOUNDER	March thru May	Shoal areas 6 to 18	Sandy	Attached	Fore River
DAB	March thru May	300 feet	--	Buoy	Along entire Coast of Maine
WHITING	Summer	--	--	Buoy	Entire Gulf of Maine
MAHOGANY CLAM	--	--	--	--	Along Coast of Maine

transferred from one trophic level to another.[9] Their findings varied from 10 to 20 percent with 15 percent considered the acceptable figure for the continental shelf. Generally, the benthic community is considered as the third trophic in a series of five.

Using the 15 percent transfer figure, 30,000 grams of food would be lost to the 4th trophic levels, and for the 5th level, 7,500 grams. This last level is where most commercial fish are found.

Many organisms consume about 1 to 5 percent of their body weight per day. For simplicity's sake, if it is assumed that all fish feeding in an area weigh 1000 grams (2.2 lbs), then the disruption of 10,000 square meters would result in the loss of one day's feeding for 150 to 750 fish. The impact presented greatly overstates the case, for it is assumed that the benthic community would be lost for a year. It is likely that the bottom would be rapidly repopulated, and this could lessen the impact.

The potential exists that organisms present in the sediment from the Portland Harbor could survive the entirely new environment of the disposal site. This could lead to foreign species being introduced into Casco Bay, and the possibility of the species becoming a nuisance. However, it would be extremely difficult to predict which species would survive and the impact that this might create.

GENERAL ECOLOGICAL IMPACTS

The disposal site being proposed was last used in the 1940's. Consequently, if disposal does take place, there could be a change from the present ecological community. However, from the preceding analysis on impact, it is doubtful that any significant change to the ecosystem of the Casco Bay region would result.

ARCHAEOLOGICAL IMPACTS

The Corps has coordinated the dredging and disposal of the Portland Harbor sediments with the Maine Historic Preservation Commission to determine if there would be any adverse impacts to any cultural resources. Their determination is that there would be none (See letter following of Coordination Section).

OTHER PROPOSED ACTIONS

In 1979 the Environmental Protection Agency (EPA) is expected to conduct two survey cruises at the proposed disposal site to obtain data for an Environmental Impact Statement; the EIS will form the basis for designating the site for dredge material disposal.

In addition, the Corps initiated a monitoring program of the site in 1977 which was designed to comply with Sections 228.9 and 228.10 of the Ocean Dumping Regulations. The monitoring will continue for the duration of the site's usefulness or until sufficient data has been gathered to make valid predictions of the environmental consequences of disposal operations.

Some private concerns may also dredge portions of the Portland Harbor, and it is likely that the additional materials may be dumped at the proposed disposal site.

SUMMARY

Based on the material presented in this supplement, the Corps finds that impacts to the ecosystem from ocean disposal of the Portland Harbor sediments would be acceptable.

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MAINE HISTORIC PRESERVATION COMMISSION
242 State Street
Augusta, Maine 04333

Earle G. Shettleworth, Jr.
Director

Telephone:
207-289-2133

September 26, 1978

Mr. Joseph L. Ignazio
Chief, Planning Division
New England Division, Corp of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

RE: NEDPL-R

Dear Mr. Ignazio:

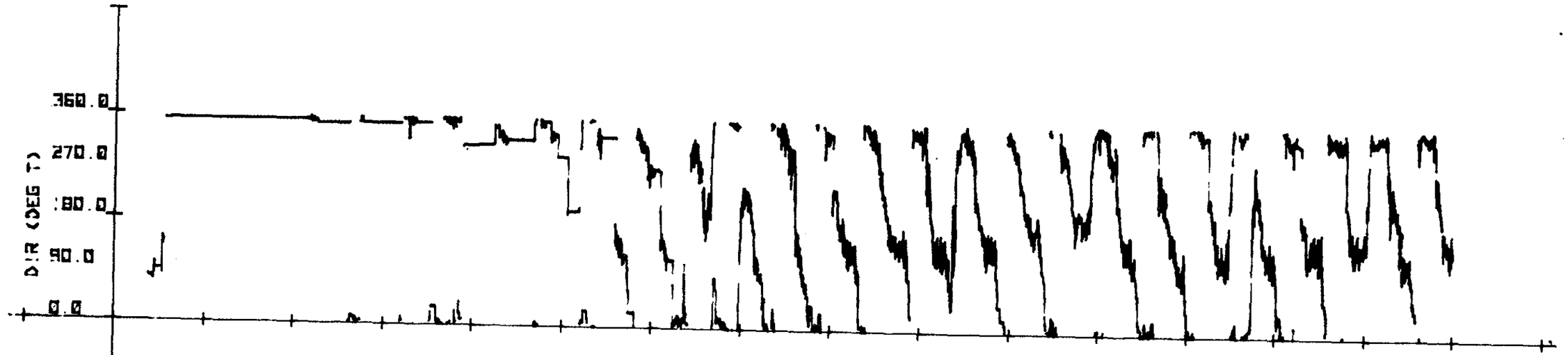
In response to your recent request, I have reviewed your plans for proposed maintenance and improvement dredging within the 35-foot Fore River Channel and Turning Basin of the main harbor at Portland, Maine.

I find that this project will have no effect upon any structure or site of historic, architectural, or archaeological significance as defined by the National Historic Preservation Ace ot 1966.

If I can be of further assistance concerning this matter, please do not hesitate to let me know.

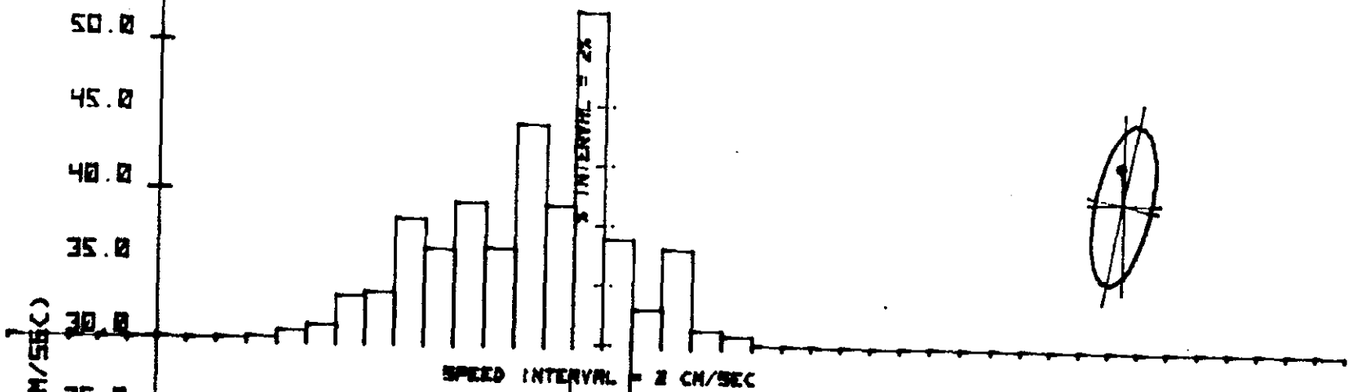
Sincerely,

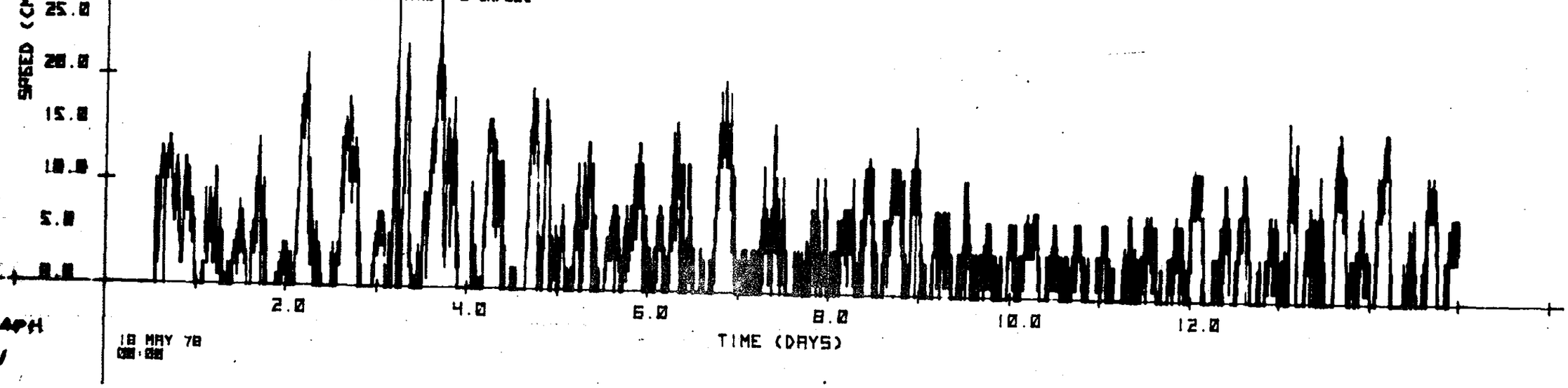
Earle G. Shettleworth, Jr.
State Historic Preservation Officer



PORTLAND, ME.
18 MAY 78 TO 10 JULY 78

MEAN SPEED (CM/SEC): 1.70
MEAN DIRECTION (DEG. T): 357
HORIZ. KINETIC ENERGY (CM↑2/SEC↑2): 25.7
MOTION ELLIPSE:
  SEMI-MAJOR AXIS (CM/SEC): 4.7
  DIRECTION (FLOOD, DEG. T): 016
  ECCENTRICITY: 0.924
AVG. 10% HIGHEST SPEEDS (CM/SEC): 13.7





GRAPH #1

DIR (DEG T)

360.0
270.0
180.0
90.0
0.0

50.0
45.0
40.0
35.0
30.0

% INTERVAL = 5%

SPEED INTERVAL = 2 CM/SEC

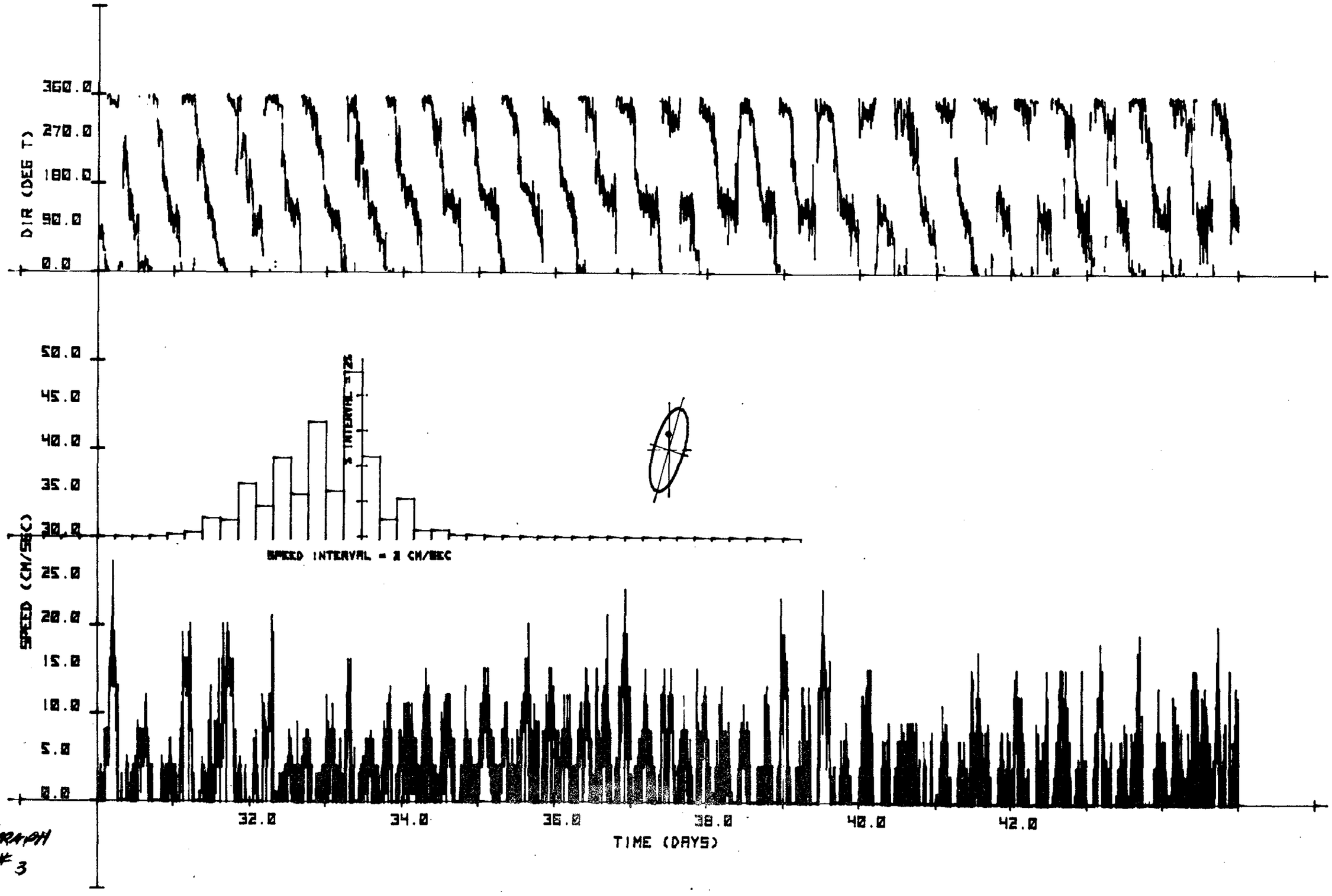
SPEED (CM/SEC)

25.0
20.0
15.0
10.0
5.0
0.0

16.0 18.0 20.0 22.0 24.0 26.0 28.0

TIME (DAYS)

GRAPH


DIR (DEG T)
360.0
270.0
180.0
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45.0
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SPEED (CM/SEC)
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20.0
15.0
10.0
5.0
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% INTERVAL
SPEED INTERVAL = 2 CM/SEC
32.0
34.0
36.0
38.0
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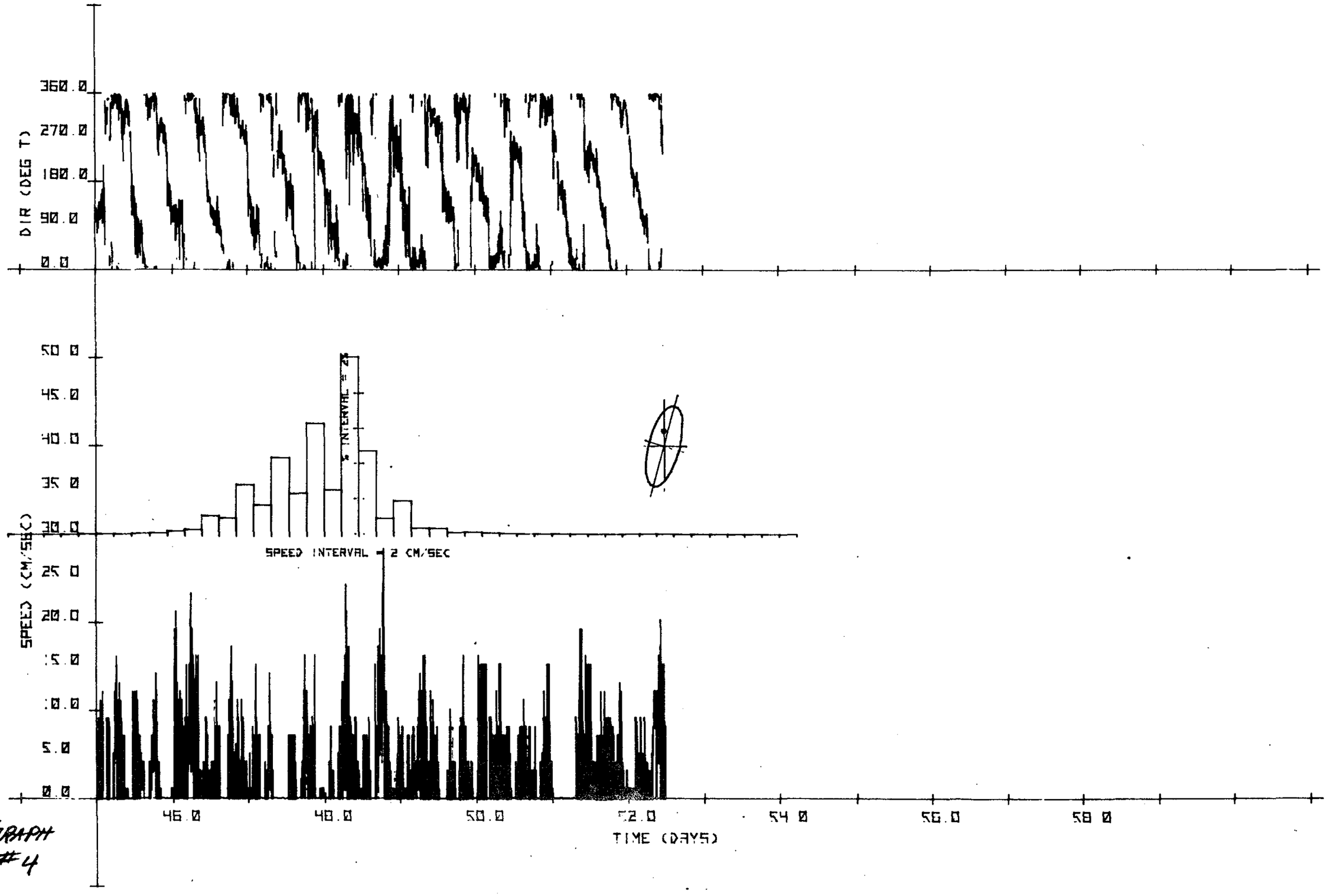
42.0
TIME (DAYS)

GRAPH #3


DIR (DEG T)
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270.0
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40.0
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SPEED (CM/SEC)
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20.0
15.0
10.0
5.0
0.0
SPEED INTERVAL = 2 CM/SEC
46.0
48.0
50.0
52.0
54.0
56.0
58.0
TIME (DAYS)

GRAPH #4